

LING5024

@]b[i]gh]Wg $^{\circ}$ 5ddfcUWXYg $^{\circ}$ hc $^{\circ}$ Gdc $^{\circ}$ Yb $^{\circ}$ 9b[$^{\circ}$]g\

GYa YghYf'CbY''##'&\$%

7ci fgY'Cj Yfj]Yk

GHJZZ7cbHJWh8YHJ]`g`

'7cbj Ybcfg'

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
>Ua Ygʻ@YY	ʻUa Yg"`YY4 i bgk "YXi "Ui	O	&&* A cfj Yb 6fck b 6i]X]b[Ya U]` dfYZYffYX" -',)`% *%

GWkcc~7cbhJWh~abZcfa Uhlcb

GWkcc~cZ<ia Ub]h]Yg~UbX~@Ub[iU[Yg

@cWUhcb. GW.cc CZIWYZA cfj Yb.6fck b.6i]X]b[z@Yj Y.8z.8),

CdYb]b[< ci fq. 'A cbXUm!': f]XUmž-Ua '!'(.() da

D\cbY.'Ž*%'&'-',)'%*,%

: UI . Ž * % & - ' ,) ', +\$)

9a U]`. \<u>U`4 i bgk "YXi "Ui</u>

5 hryb X Ub WY F Yei] f Ya Yb hg

5 'ghi XYbhi]g'Yl dYWYX'hc'UhhYbX'U```WUgg'WebhUWi\ci fg'Zcf'U'ZUWY!hc!ZUWY'fl &: Ł'cf'V`YbXYX'Wei fgY'UbX Wea d'YhY'U```UWIjj]hJYg'Zcf'U'V'YbXYX'cf'Z ``mcb`]bY'Wei fgY"

5 'ghi XYbhik \c'Uff]j Ygʻa cfYʻh\Ubʻ%) 'a]bi hYgʻ`UhYʻa UmVYʻdYbU`]gYXʻZcfʻbcb! UhhYbXUbWY"'⊋gi W\'UʻdYbU`hm]gʻ]a dcgYXž'h\Yʻghi XYbha i ghVYʻ]bZcfa YXʻj YfVU``mUhh\YʻYbXʻcZWUggʻUbXʻUXj]gYXʻ]bʻk f]h]b['k]h\]bʻ&(\ci fg"

⊋Uʻgh XYbhYl dYf]YbWrgʻ]`bYggža]gUXj Ybh fYʻcfʻch\YfʻcWW ffYbWrʻh\Uha U_YgʻUVgYbWʻZfca ʻU WUgg#UWfj]hmi bUj c]XUV`YžcfʻYl dYWgʻhcʻVYʻUVgYbhZfca ʻUʻZcfh\Wda]b[ʻWUgg#UWfj]hmžh\Ymg\ci `XʻgYY_ dYfa]gg]cbʻZfca ʻh\Yʻ7 ci fgYʻ5i h\cf]hmžʻUbXʻk \YfYʻUdd`]WUV`Yž'h\Y]fʻfYei Yghg\ci `XʻVYʻUWWda dUb]YXʻVmUb cf][]bUʻʻcfʻWYff]ZJYX`WcdmcZUʻa YX]WUʻʻWYff]ZJWUhYʻcfʻch\YfʻZcfa ʻcZUddfcdf]UhYʻYj]XYbWY''

5.7 ci fgY 5 i h\cf]hma UmYl W gY 'U'ghi XYbhZica 'WUggYg'cf'UWjj]hJYg'Zcf'i d'hc'cbY'a cbh\"'<ck Yj Yfž'h\Ym a UmUgg][b'UXX]hJcbU``UbX#cf'U'hYfbUhJj Y'HUg_g'hc'Ybgi fY 'Wca d`]UbW'":5.7 ci fgY 5 i h\cf]hm'Wcbg]XYf]b['h\Y [fUbh]b['cZUVgYbW'a i gh'VY'gUhJgZJYX'U'ghi XYbhk]``'gh]``'VY'UV'Y'hc'a YYhh\Y'Wci fgY'g'`YUfb]b['ci hWca Yg UbX#cf'j c'i a Y'cZ`YUfb]b["'5'ghi XYbhgYY_]b['Uddfcj U`'hc'VY'UVgYbhZcf'a cfY'h\Ub'cbY'a cbh\'a i gh'Udd`m]b'k f]hJb['hc'h\Y'8 YUb'UbX'dfcj]XY'U``cf][]bU`'cf'WfhJZJYX'gi ddcfh]b['XcW a YbhUhJcb"

: cf'a cfY']bZcfa Uh]cb'UVci hih\Y'UhhYbXUbW'dfchcWc`g']b'h\Y': UW'`hmcZ'5fhg'UbX'GcW]U`GW]YbW'g. \\hdg.#k k k "Ufhg"i bgk "YXi "Ui #W'ffYbHgh XYbhg#UWUXYa]\W]bZcfa Uh]cb#dfchcWc`g![i]XY`]bYg#

5 WUXYa]W±bZcfa Uhjcb.

: cf`YggYbhJU``ghi XYbh`]bZcfa UhJcb`fY`UhJb[`hc.`fYei Yghg`Zcf`Yl hYbg]cb/fYj]Yk `cZa Uf_g/cWW dUhJcbU``\YU`h\UbX`gUZ/my'Yl Ua]bUhJcb'dfcWXi fYg/gdYWJU``Wcbg]XYfUhJcb`]b'h\Y'Yj YbhcZ]``bYgg`cf`a]gUXj Ybhi fY/ghi XYbhYei]hmUbX`X]gUV]`]hm/UbX`ch\Yf`YggYbhJU``UWUXYa]W]bZcfa UhJcbž gYY`\hdg.#k k k "Ufhg"i bgk "YXi "Ui #W ffYbhghi XYbhg#JWUXYa]W]bZcfa UhJcb#dfchcWc`g![i]XY`]bYg#

7ci fgY 8YW] g

7 fYX]h'Dc]bhg'*

Gi a a UfmcZh\Y 7ci fgY

Mci 'k]``YI d`cfY'h\Y'dUhYfbg`cZgdc_Yb`9b[`]g\":Mci 'Z̄fghYI Ua]bY'h\Y'Zcfa UhJcb`cZgci bXg`UbX'h\Y gci bXg`H\Uha U_Y'i d'h\Y'9b[`]g\ gci bX'gmghYa "'Mci 'h\Yb'Vi]`X'Z̄fca 'g]b[`Y'gci bXg'hc'h\Y'Wca V]bUhJcb`cZ gci bXg']bhc'gm`UV'Yg'UbX'h\Y'fc'Y'cZgm`UV'Yg']b'9b[`]g\'f\nth\a ž'h\Uh]gž'h\Y'a Y`cX]\W\cbrci f'cZ gYbhYb\Wg"'\Ci 'U'gc'YI Ua]bY'h\Y'\cbghfi \WJcb'cZk cfXg'Z̄fca 'gci bXg'UbX'h\Y'\wca V]bUhJcb'cZk cfXg']bhc d\fUgYg'UbX'gYbhYb\Wg"':]bU``mž'mci 'YI d`cfY'k\UhHU_Yg'd`U\W'U\Vcj Y'h\Y'gci bXgž'h\Uh]gž'U\W\bhi UhJcb UbX']bhcbUhJcb']b'Vch\'Zcfa U``UbX'\\cei]U``\wcbhYl fg"'H\]g'\wci fgY'\Ug'Udd`]\WJhJcbg'Zcf`]b[i]ghg'k\c Yj U`i UhY'UbX'UbbchUhY'gdc_Yb'`Ub[i U[Y'XUhU']b'`Ub[i U[Y#]b[i]gh]\\g'']bXi ghf]Ygž]bhYfdfYhYfg'k cf_]b[']b a i `h]`]b[i U`gYhJb[g'k]'g\'g\'g\'g\'y\g''\U\X'Yfg'cZ9b[`]g\'U\X'YbC'\cgY'k\c k]q\'hc'_bck 'a cfY'U\ci h'9b[`]g\'g\'d\cbYh\\g'UbX'd\cbc`c[m'

5 hh Y WcbWi g]cb cZh]g Wci fgY h Y gh XYbhk]``VY UV Y hc

%" XYgWf]VY'h\Y'_Ym'Z'Uhi fYg'cZh\Y'9b[`]g\'gci bX'gmghYa ']bWi X]b['UVWYbhi Uh]cb'UbX']bhcbUh]cb" &" UbU'mgY``]b[i]gh]WXUh'U'UbX'Uf[i Y'h\Y'a Yf]hg'cZh\UhiUbU'mg]g" \" "Wa dUfY'Wa'`cei]U`'UbX'Zcfa U`'dUhhYfbg'cZgdc_Yb'9b[`]g\"

HYUWX]b['GhfUhY[]Yq'

 $H\Y'Wci fgY']g'HUi [\h'Ug'U'k YY_`mik c'\ci f'gYa]bUf'''< U`ZcZh\Y'gYa]bUf''dfYgYbhg'h\Y'WcbW'dh U`_bck `YX[Y'cZh\Y'dUhYfbg'cZgdc_Yb'9b[`]g\'''+b'h\Y'gYWcbX'\U`ZcZh\Y'gYa]bUf'ghi XYbhg'k cf_'k]h\gdYYW\'gUa d`Yg']b'k \]W\'h\YmUdd`mh\Y'WcbW'dhi U`'_bck `YX[Y'hc'h\Y'UWhi U`'dfcXi Whjcb'UbX Wca dfY\Ybg]cb'cZgdc_Yb'9b[`]g\'''$

5ggYgga Ybh

5ggYgga Ybh'HUg_g'

5ggYgga Ybh'hJg_	K Y][\h	8i Y [.] 8UhY	Gh XYbh@YUfb]b[Ci hWca Yg 5ggYggYX
DfYgYblUljcb	%) ၊	5gʻUgg][bYX	&
Dfc YWh) \$1	%&#\$*#&\$% `\$(.\$\$`DA</td><td>%<u>ž&</u>Ž</td></tr><tr><td>±b!WUggʻhYghi</td><td>')।</td><td>&, #\$' #&\$% `\$).\$\$`DA</td><td>%</td></tr></tbody></table>	

5ggYgga Ybh'8YhJ]`g

5ggYgga Ybh% DfYgYbhJh]cb

GHJfh:XUhY.

@Yb[h\.'%)!&\$'a]bihYg

8YHJ]`g. '%) '! '&\$ a]bi hYg" 'Gh XYbhg 'fYWY]j Y k f]hYb 'ZYYXVUW<u>"</u>"

 $\label{thm:limit} \begin{tabular}{ll} Hi & fb & fb & gYh &$

5ggYgga Ybh& Dfc YWh

GHJfh:XUhY.

8YHJ]`g. `Ghi XYbhg`k]```k cf_k]h\`gdYYW\`gUa d`Yg`h\fci [\ci hh\Y`hYfa `UbU`mg]b[`h\Y`gdYYW\`UWWcfX]b[`hc Wci fgY`hcd]Wg":H\YfY`Ugg][ba Ybhg`h\UhWca df]gY`h\Y`dfc YWf":HchU``bi a VYf`cZk cfXg`]g Uddfcl]a UhY`m' \$\$\$"`Ghi XYbhg`fYWY]j Y`k f]hhYb`ZYYXVUW_"`H\]g`]g`h\Y`Z]bU``Ugg][ba YbhZcf`UhhYbXUbWV di fdcgYg"

Hi fb]hjb gYhjb[. `H\]g Ugg][ba Ybh]g gi Va]hhYX h\fci [\`Hi fb]hjb UbX gh XYbhg Xc bchgYY Hi fb]hjb g]a]`Uf]hmfYdcfhg"

5ggYgga Ybh' = b!WUgg hYgh

GhUfh'XUhY.

@Yb[h\. "%") \ci fg

 $8YHU]`g. `H\Y`hYghWcj Yfg`h\Y`WcbhYbhcZfYUX]b[g`UbX`gYa]bUf`X]gW gg]cb`cZh\Ya"`%") `\ci fg"`Gh XYbhg fYWY]j Y`k f]hYb`ZYYXVUW_"$

Hi fb]h]b gYh]b[. H\]g]g bchU Hi fb]h]b Ugg][ba Ybh

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

Gh XYbhg UfY Yl dYWYX hc di hh\Y]f bUa Yg UbX gh XYbhbi a VYfg cb Yj YfmdU[Y cZh\Y]f Ugg][ba Ybhg"

Hi fb]h]b Gi Va]gg]cb

Imagi YbWci bhYf'U'dfcV'Ya 'k \Yb'UthYa dr]b['rc'gi Va]hmci f'Ugg][ba Ybht\fci [\'Hi fb]r]bž'd'YUgY hY'Yd\cbY'9I hYfbU'Gi ddcfhcb'-',) "''' %cf'Ya U] hYa 'cb'<u>Yl hYfbU'hY'hgi ddcfh4 i bgk "YXi "Ui"</u> "Gi ddcfh \ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY_XUmg'UbX'-.\$\$Ua '-') .\$\$da 'cb'k YY_YbXg'fl *) 'XUmg'U'mYUft'" Imai UfY'i bUV'Y 'rc'gi Va]hmci f'Ugg][ba YbhXi Y'rc'U'ZJi 'hk]h\ 'Hi fb]h]b'mci 'a UmUdd'mZcf'Ub'YI hYbg]cbž'Vi hmci a i ghfYhJ]b'mci f'h]\W_Yhbi a VYf'Zfca '9I hYfbU''Gi ddcfhfU'cb['k]h\ 'Ubmch\Yf'YYj UbhXcW a Ybhgt'rc]bWi XY'Ug'Yj]XYbW' 'rc'gi ddcfhmci f'Yl hYbg]cb'Udd']\WJhjcb"'Imai 'Ya U]''9I hYfbU''Gi ddcfhmci 'k]'`Ui hca Uh]\WJ'`mfY\W']j Y'U'h]\W_Yhbi a VYfž'Vi h]Zmci 'hY'Yd\cbY'mci 'k]'``bYYX'rc'gdY\WZ\WJ'`mUg_'Zcf'cbY'' Hi fb]h]b'U'gc'dfcj]XYg'i dXUhYg'cb'h\Y]f'gmghYa 'ghUh' g'cb'Hk]hYf''

; YbYfU`mž'UggYgga YbhitUg_g'a i ghVY'gi Va]hhYX'Y`YWfcb]WU``mj]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ba Ybh''=b']bghUbWfg'k \YfY'h\]g']g'bchdcgg]V`Yž']hk]```VY'ghUhYX'cb'mci f'Wci fgY'g'A ccX`Y'g]hY'k]h\U`hYfbUh]j Y'gi Va]gg]cb'XYhU]`g"

@UhY 5ggYgga Ybh'DYbU`h]Yg

5b'UggYggYX'HUg_']g'XYYa YX``UhY']Z]h']g'gi Va]hhYX'UZhYf'h\Y'gdYW]Z[YX'h]a Y'UbX'XUhY'Ug'gYhci h']b'h\Y Wci fqY'@YUfb]b['A UbU[Ya YbhGmqhYa 'f@A GŁ"

 $\label{thm:condition} $$HY^UHY^dYbU^m]g^hY^cgg^cZ)_L^cZ^hY^hcHU^dcgg]VY^aUf_g^Zcf^hYY^HUg_Z^cf^YUW^XUmcf^dUfhhYfYcZhY^kcf_]g^UHY^@UhYbYgg^k]^*]bW^XY^kYY_YbXg^UbX^di_V^]WYc^]XUmg^"HY]g^XcYg^bchUdd^mhc^U'HUg_'hWh]g^UqqYqqYX^Vi_hbc^aUf_]g^Uk_UfXYX"$$$

K cf_'gi Va]hhyx'zci fhyyb'fl%(EXUmg'Uzhyf'h\y'Xi Y'XUhy'k]``VY'a Uf_YX'UbX'zYYXVUW_'dfcj]XYX'Vi hbc'a Uf_ k]``VY'fYWcfXYX"'=Zh\Y'k cf_'k ci `X'\Uj Y'fYWr]j YX'U'dUgg'a Uf_'Vi hzcf'h\Y'`UhybYgg'UbX'h\Y'k cf_']g'U Wca di `gcfm'Wci fgY'Wca dcbYbhz'U'gh XYbh'k]``VY'XYYa YX'hc'\Uj Y'a Yhih\UhfYei]fYa Ybh''H\]g'XcYg'bch Udd`mhc'U'hUg_'h\Uh']g'UggYggYX'Vi hbc'a Uf_']g'Uk UfXYX"

K cf_'gi Va]hh/X'hk YbhnlcbY'f&&XUmg'UZhYf'h\Y'Xi Y'XUhY'k]```bchVY'UWWdhYX'Zcf'a Uf_]b['cf'ZYYXVUW_UbX'k]```fYWY]j Y'bc'a Uf_'cf'[fUXY"'=Zh\Y'UggYgga YbhHUg_']g'U'Wca di `gcfmWca dcbYbhcZh\Y'Wci fgY'Ugh XYbhk]```Ui hca UhJWU``mZU]`'h\Y'Wci fgY"

GdYWJU`7cbg]XYfUhJcb55dd`]WUhJcbg

 $\label{eq:linear_continuity} $$Mc_i = W_0 - W_$

G]W_bYggža]gUXj Ybhi fY'cf'ch\Yf'W]fW a ghUbWrg'VYmcbX'mci f'Wcbhfc``a Um

ł DfYj Ybhimci Zfca Wca d`Yhlb[U.Wci fqY fYei]fYa Ybhž

ł? YYd mci Zfca 'UthYbX]b['Ub 'UggYggUV'Y 'UWnji]tmž

ł Ghod moi gi Va]hh]b['UggYggUV'Y k cf_ Zcf'U Wci fgYž

ł `G][b]Z]\WbhmUZZY\Wimci f`dYfZcfa Ub\Wr`]b`UggYggUV`Y`k cf_ž`VY`]h'U`Zcfa U``YbX!cZgYa YghYf`Yl Ua]bUh]cbž`U`\WUgg`hYghž`U``UVcfUhcfmihYghž`U`gYa]bUf`dfYgYbhUh]cb`cf`Ubmch\Yf`Zcfa 'cZUggYgga Ybh'

5 WUXYa]W<cbYghmUbX D`U[]Uf]ga

D`U[]Uf]ga i]gii g]b[ih\Yik cfXgicfi]XYUgicZch\YfgiUbXidfYgYbh]b[ih\Ya iUgimci fick b"i±i\WbihU_Yia Ubm Zcfa gžZfca iXYi]VYfUhYiW\YUh]b[ihciU\W]XYbhU`m\Wcdm]b[iZfca iUigci f\Wik]h\ci hiU\w_bck iYX[Ya Ybh'

IBGK [fcidgdu[]Uf]ga]bhch\yzc``ck]b[WUhY[cf]Yg.

7 cdm]b[.'i g]b['h\Y'gUa Y'cf'j Yfmg]a]`Uf'k cfXg'hc'h\Y'cf][]bU`hYl h'cf']XYU'k]h\ci h'UW_bck `YX[]b['h\Y gci fW'cf'i g]b['ei chUh]cb'a Uf_g"'H\]g'U`gc'Udd`]Yg'hc']a U[Ygž'Ufh'UbX'XYg][b'dfcYWhgž'Ug'k Y``'Ug dfYgYbhUh]cbg'k \YfY'gca YcbY'dfYgYbhg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci h'WfYX]h'

±DUddfcdf]UhY`dUfUd\fUg]b[.'W\Ub[]b['U'ZYk'kcfXg'UbX'd\fUgYg'k\]`Y`acghmfYhJ]b]b['h\Y`cf][]bU`ghfi WifY'UbX']bZcfaUh]cbk]h\ci hUW_bck`YX[YaYbh'H\]g'U`gc'Udd`]Yg']b'dfYgYbhJh]cbg'k\YfY`gcaYcbYdUfUd\fUgYg'Ubch\Yf'g']XYUg'cf'kcfXg'k]h\ci h\WfYX]h''±iU`gc'Udd`]Yg'hc'd]YW]b['hc[Yh\Yf'ei chYg'UbXdUfUd\fUgYg']bhc'U'bYk'k\c`Yž'k]h\ci hfYZYfYbW]b['UbX'U'ghi XYbhg'ck b'UbU`mg]g'hc'Vf]b['h\Y`aUhYf]U`hc[Yh\Yf''

7 c``i g]cb. 'k cf_]b['k]h\ 'ch\ Yfg'Vi h'dUgg]b['c\Z'h\ Y 'k cf_'Ug'U'dYfgcb'g']b\X]j]\Xi U``k cf_"'7 c``i g]cb'U`gc]b\Wi XYg'dfcj]\X]b['mci f'k cf_'hc'Ubch\ Yf'ghi XYbh\ VYZcfY'h\ Y 'Xi Y 'XUhYzcf'Zcf'h\ Y' di fdcgY'cZh\ Ya d`U[]\Uf]g]b['Uh\Ubmh]a Yz'dUm]b['Ubch\ Yf'dYfgcb'hc'dYfZcfa 'Ub'U\WUXYa]\Wh\Ug_z'ghYU']b['cf'U\\ello i]f]b[Ubch\ Yf'dYfgcb'g' U\WUXYa]\Wk cf_'Ub\X'\\ello dm]b[']hz'c\ZYf]b['hc'\\ello a d`YhY'Ubch\ Yf'dYfgcb'g' k cf_'cf'gYY_]b[d\una Ybh\Zcf'\\ello a d`Yh\beta d`

±bUddfcdf]UhY`W]hUh]cb.`7]h]b[ˈgci fW/gˈk \]WX`\Uj Y`bchVYYb`fYUXžk]h\ci hUW_bck`YX[]b[ˈh\Y`″gYWcbXUfm″gci fW/Zfca k \]WX`_bck`YX[Y`cZh\Ya`\Ug'VYYb`cVhU]bYX"

8 i d`]\WUh]cb`ff`gY`Zld`U[]\Uf]ga "Ł 'gi Va]\h]b['mci f`ck b`k cf_ž]b`k \c`Y`cf`]b`dUfhžk \YfY`]h\Ug`dfYj]ci g`m VYYb`dfYdUfYX`cf`gi Va]\hYX`Zcf`Ubch\Yf`UggYgga Ybhcf\Wci fgY`UhI BGK 'cf`Ubch\Yf`i b]j Yfg]\m'

7 cffYWhfYZYfYbWb[dfUWhWyg.

- DUfUd\fUg]b[žgi a a Uf]g]b[žYggUmk f]h]b["UbX"h]a Y a UbU[Ya Ybh
- 5ddfcdf]UhY'i gY'cZUbX'Uhff]Vi h]cb'Zcf'U'fUb[Y'cZa UhYf]U`g']bWi X]b['hYl hž']a U[Ygž'Zcfa i `UY'UbX WbWYdhq"

±0X]j]Xi U``Ugg]ghUbWr`]g`Uj U]`UV`Y`cb`fYei YghZfca `H\Y`@YUfb]b[`7 YbhY`f<u>\hd.#k k k "`Wi bgk "YXi "Ui #</u>" Gh XYbhg`UfY`U`gc`fYa]bXYX`h\UhWUfYZ ``ha Ya UbU[Ya Ybh']g`Ub`]a dcfhUbhdUfhcZgh XmUbX`cbY`cZh\Y]XYbh]Z]YX`WUi gYg`cZd`U[]Uf]ga `]g`dccf`ha Y`a UbU[Ya Ybh'`Gh XYbhg`g\ci `X`U``ck `gi Z]W]Ybh'ha Y`Zcf fYgYUfW\žXfUZh]b[`UbX`dfcdYf`fYZYfYbW]b[`cZgci fWfg`]b`dfYdUf]b[`U```UggYgga Ybh']hYa g"

IBGK "@]VfUfmU`gc`\Ugʻth\Y`9@&9`hcc``Uj U]`UV`Y`hc`Ugg]ghimci ik]h\`mci f`ghi Xm'Uhi BGK "'9@&9`]g XYg][bYX`hc`]bhfcXi WK`bYk `ghi XYbhg`hc`ghi Xm]b[`Uhi BGK `Vi h`]h\Wb'U`gc`VY`U`[fYUhfYZfYg\Yf`Xi f]b[`mci f ghi Xm'

7 ca d'Yhlp['h\Y'9@&9'h hcf]U`'UbX'ei]n'k]``'YbUV'Y'mci 'hc.



7ci fgY GWX YXi `Y

J]Yk WUgg ha YhUV Y

H]a YHJV`Y

8UhY HmdY 7cbhYbh		
K YY_'%'&*': YVfi Ufm'!'(GYa]bUf 7 ci fgY'±blfcXi Wjcb	7 ci fgY`±blfcXi Wjcb	
A UfVX		
7 \UdhYf%GYhjb['h\Y'GhU[Y		
K YY_'&.') 'A UfWX'!' '% GYa]bUf F YUX'df]cf'hc'Wca]b['hc'WUgg.		
7 \UdhYf'&'Dfc\W'ggYg']b'7cbj \	/faUhchU`'9b[`]a\ž	
gYW1cbg'&"%2'&"&"'UbX'&"'	go. jo . o . , o []g . =	
K YY_'' . '%'A UfW.'! '% GYa]bUf F YUX'df]cf'hc'Wca]b['hc'WUgg.		
A UfVX		
7\UdhYf`&`DfcW'ggYg`]b``7cbj`	YfgUhjcbU`'9b[`]g\ž	
gYWjcbg'&"(ž'&") ž'UbX'&"*"		
K YY_'(.'% 'A UfWX'!'&) GYa]bUf F YUX'df]cf'hc'Wca]b['hc'WUgg. A UfWX		
7 \UdhYf'&'Dfc\W'ggYg']b'7 cbj \	YfaUhcbU`'9b[`la\ž	
gYW1cbg'&"+"UbX'&", "	9-12 /~[18 /-	
K YY_`).`&*`A UfW\`!`% 5ggYgga Ybh =\text{\psi}WUgg`HYgh		
5df)`		
6fYU '&'5df]`'!', '5df]` Dfc YWh		
K YY_'*.'- '5df]`'!'%) '5df]` Dfc'YWh F YUX'df]cf'hc'\Waa]b['hc'\Wugg.		
7\UdhYf" '5hhYa dhg'Uh'D\cbc'	c[]\W ``Q d` h Hch	
K YY_'+.'%*'5df]`'!'&& GYa]bUf F YUX'df]cf'hc'Wca]b['hc'WUgg.		
5df)		
7 \ UdhYf" ('91 dYf]a YbhU``Gh X]	Ygʻ]bʻ7 Ugi U`GdYYWXž	

F YUX[·]

FYgci fWfg

DfYgWf]VYX F Ygci fWYg

• 6cc_'-'Gci bX'DUHYfbg'cZ9b[`]g\'Vm@]bXU'G\cW_Ym''6`UW_kY``'Di V`]g\Yfg"

FYWca a YbXYX FYgci fWYg

Bch'Uj U]`UV`Y

7ci fgY 9j U`i Uh]cb UbX 8Yj Y`cda Ybh

A m91 dYf]YbWY gi fj Ymg'UfY'h\Y'df]a Ufma YUbg'Zcf'ghi XYbhg'hc'dfcj]XY'ZYYXVUW_hc'h\Y'Wci fgY'Wcbj Ybcf" \#DZcfa U`'gi fj Ymg'a Um'U`gc'VY'i gYX"'6UgYX'cb'dfYj]ci g'Yj U`i Uh]cbgž'k Y'\Uj Y'W\Ub[YX'Wci fgY'a UhYf]U`g UbX'UggYgga Ybhg"

a U[Y'7fYX]h

GmbYf[]Yg^]b^GcibX^&\$%*

7F = 7CG

7 F = 7 C G 'Dfcj]XYf'7 cXY. '\$\$\$-,;